What is claimed is:

1. A process for the preparation of a silicon single crystal in which molten silicon is solidified into a crystal in accordance with the Czochralski method to form an ingot having a central axis, a seed-cone, an end-cone, a constant diameter portion between the seed-cone and the end-cone having a lateral surface, and a radius, R, extending from the central axis to the lateral surface of at least about 75mm, the constant diameter portion having an axial length, L, the process comprising;
controlling a ratio, v/G_0, wherein, v is a growth velocity and, G_0 is an average axial temperature gradient over the temperature range from solidification to a temperature of no less than about 1325 °C, during the growth of the constant diameter portion of the crystal, to initially produce in the constant diameter portion of the ingot a series of predominant intrinsic point defects alternating along the axis, the series comprising $N_{vac.}$ vacancy dominated regions and $N_{int.}$ silicon self interstitial dominated regions, wherein $N_{vac.}$ is at least 2 and $N_{int.}$ is at least 1, the vacancy dominated regions each having an axial length, $L_{vac.}$, and a radius, $R_{vac.}$, extending from the axis of the ingot towards the lateral surface which is at least about 10% of the radius, R, of the constant diameter portion of the crystal, the silicon self-interstitial dominated region(s) each having an axial length, $L_{int.}$, and a radial width which is equal to the radius, R, of the constant diameter portion of the silicon single crystal;
cooling said regions from the temperature of solidification at a rate which allows silicon self-interstitial atoms to diffuse radially to the lateral surface and to diffuse axially to vacancy dominated regions to reduce the concentration of silicon self-interstitial atoms in the region(s) in which silicon self-interstitial atoms were initially the predominant intrinsic point defect and to

reduce the concentration of crystal lattice vacancies in the region(s) in which crystal lattice vacancies were initially the predominant intrinsic point defect.

2. The process of claim 1 wherein the ratio, v/G_0, is controlled by controlling the growth velocity, v.

3. The process of claim 1 wherein the regions in which crystal lattice vacancies are the predominant intrinsic point defects have a radius, $R_{vac.}$, extending from the axis of the ingot towards the lateral surface which is at least about 50 % of the radius, R, of the constant diameter portion of the crystal.

4. The process of claim 1 wherein the regions in which crystal lattice vacancies are the predominant intrinsic point defects have a radius, $R_{vac.}$, extending from the axis of the ingot towards the lateral surface which is at least about 90 % of the radius, R, of the constant diameter portion of the crystal.

5. The process of claim 1 wherein the cooling rate of the ingot is controlled such that the regions are cooled from the temperature of solidification to a temperature, T_A, at which agglomerated intrinsic point defects nucleate, such that the regions are maintained at a temperature above T_A for a time period of at least an effective dwell time, $t_{dw-eff.}$, required to prevent the formation of agglomerated intrinsic point defects in the interstitial dominated regions.

6. The process of claim 5 wherein the temperature, T_A, at which agglomerated interstitials nucleate is from about 850°C to about 1,100°C.

7. The process of claim 5 wherein the temperature, T_A, at which agglomerated interstitials nucleate is from about 870°C to about 970°C.

8. The process of claim 2 wherein the growth velocity is controlled such that the growth velocity during the formation of the vacancy dominated region, $v_{vac.}$, is at least about 1.5 times a critical value, $v_{crit.}$, and the growth velocity during the formation of the interstitial dominated region, $v_{int.}$, is less than about 0.9 times the critical value $v_{crit.}$.

9. The process of claim 8 wherein the ratio of $L_{vac.}/L_{int.}$ is at least about 0.23.

10. The process of claim 8 wherein $v_{vac.}$ is at least about 2 times the critical value, $v_{crit.}$, during the growth of the vacancy dominated regions.

11. The process of claim 8 wherein the ratio of $L_{vac.}/L_{int.}$ is at least about 0.17.

12. The process of claim 8 wherein $v_{vac.}$ is at least about 2.5 times the critical value, $v_{crit.}$, during the growth of the vacancy dominated regions.

13. The process of claim 12 wherein the ratio of $L_{vac.}/L_{int.}$ is at least about 0.14.

14. The process of claim 2 wherein growth velocity is controlled such that the growth velocity during the formation of the vacancy dominated region, $v_{vac.}$, is at least about 1.5 times a critical value, $v_{crit.}$, and the growth velocity during the formation of the interstitial dominated region, $v_{int.}$, is less than about 0.5 times the critical value $v_{crit.}$.

15. The process of claim 14 wherein the ratio of $L_{vac.}/L_{int.}$ is at least about 0.12.

16. The process of claim 14 wherein $v_{vac.}$ is at least about 2 times the critical value, $v_{crit.}$, during the growth of the vacancy dominated regions.

17. The process of claim 16 wherein the ratio of $L_{vac.}/L_{int.}$ is at least about 0.1.

18. The process of claim 14 wherein $v_{vac.}$ is at least about 2.5 times the critical value, $v_{crit.}$, during the growth of the vacancy dominated regions.

19. The process of claim 18 wherein the ratio of $L_{vac.}/L_{int.}$ is at least about 0.08.

20. The process of claim 1 wherein region(s) in which silicon self-interstitial atoms are the predominant intrinsic point defects have an axial length, $L_{int.}$, which is at least about 25% of the radius, R, of the constant diameter portion of the crystal.

21. The process of claim 20 wherein the effective dwell time, $t_{dw-eff.}$, is at least about 20% of the dwell time required to allow a sufficient quantity of silicon self-interstitial atoms to diffuse to the surface of the ingot only to suppress the concentration of silicon self-interstitial atoms below a critical concentration required for agglomerated intrinsic point defects to nucleate, in an ingot wherein silicon self-interstitial atoms are the predominant intrinsic point defect throughout the entire constant diameter portion of an ingot.

22. The process of claim 1 wherein region(s) in which silicon self-interstitial atoms are the predominant intrinsic point defects have an axial length, $L_{int.}$, which is less than about twice the radius, R, of the constant diameter portion of the crystal.

23. The process of claim 22 wherein the effective dwell time, $t_{dw\text{-}eff.}$, is less than about 85% of the dwell time required to allow a sufficient quantity of silicon self-interstitial atoms to diffuse to the surface of the ingot only to suppress the concentration of silicon self-interstitial atoms below a critical concentration required for agglomerated intrinsic point defects to nucleate, in an ingot wherein silicon self-interstitial atoms are the predominant intrinsic point defect throughout the entire constant diameter portion of an ingot.

24. The process of claim 1 wherein region(s) in which silicon self-interstitial atoms are the predominant intrinsic point defects have an axial length, $L_{int.}$, which is about equal to radius, R, of the constant diameter portion of the crystal.

25. The process of claim 24 wherein the effective dwell time, $t_{dw\text{-}eff.}$, is about 60% of the dwell time required to allow a sufficient quantity of silicon self-interstitial atoms to diffuse to the surface of the ingot only to suppress the concentration of silicon self-interstitial atoms below a critical concentration required for agglomerated intrinsic point defects to nucleate, in an ingot wherein silicon self-interstitial atoms are the predominant intrinsic point defect throughout the entire constant diameter portion of an ingot.

26. The process of claim 1 wherein the radius of the constant diameter portion of the ingot, R, is at least about 100 mm.

27. The process of claim 1 wherein the radius of the constant diameter portion of the ingot, R, is at least about 150 mm.

28. The process of claim 1 wherein the length of the constant diameter portion of the ingot, L, is at least about 400 mm.

29. The process of claim 1 wherein the length of the constant diameter portion of the ingot, L, is at least about 600 mm.

30. The process of claim 1 wherein the length of the constant diameter portion of the ingot, L, is at least about 1000 mm.

31. The process of claim 1 wherein the constant diameter portion of the ingot initially comprises at least about 2 vacancy dominated regions.

32. The process of claim 1 wherein the constant diameter portion of the ingot initially comprises at least about 4 vacancy dominated regions.

33. The process of claim 1 wherein the constant diameter portion of the ingot initially comprises at least about 6 vacancy dominated regions.

34. The process of claim 1 wherein the constant diameter portion of the ingot initially comprises at least about 8 vacancy dominated regions.

35. The process of claim 1 wherein the total quantity of vacancies in the initial vacancy dominated regions is greater than the total quantity of interstitials in the initial interstitial dominated regions.

36. The process of claim 1 further comprising quench cooling the ingot to a temperature less than a temperature at which agglomerated intrinsic point defects nucleate.

37. A single crystal silicon ingot having a central axis, a seed-cone, an end-cone, and a constant diameter portion between the seed-cone and the end-cone having a circumferential edge and a radius extending from the central axis to the circumferential edge, the single crystal silicon ingot, after being grown and cooled from the solidification temperature, having a constant diameter portion comprising multiple axially symmetric regions alternating along the axis of the ingot between a region wherein vacancies are the predominant intrinsic point defect and a region wherein interstitials are the predominant intrinsic point defect, the ingot having at least 2 interstitial dominant regions which are substantially free of agglomerated interstitial defects separated by a vacancy dominant region along the axis of the constant diameter portion of the ingot, wherein the radius of the constant diameter portion of the ingot is at least about 75 mm.

38. The ingot of claim 37 having a radius of at least about 100 mm or greater.

39. The ingot of claim 37 having a radius of at least about 150 mm.

40. The ingot of claim 37, wherein the length of the constant diameter portion of the ingot is at least about 400 mm.

41. The ingot of claim 37, wherein the length of the constant diameter portion of the ingot is at least about 600 mm.

42. The ingot of claim 37, wherein the length of the constant diameter portion of the ingot is at least about 800 mm.

43. The ingot of claim 37, wherein the length of the constant diameter portion of the ingot is at least about 1000 mm.

44. A population of wafers sliced from an ingot having a central axis, a seed-cone, an end-cone, produced by the process of claim 1, said wafers being substantially free of agglomerated interstitial defects, wherein the wafers were selected based on the diameter of the wafer.

45. A population of wafers sliced from a single silicon ingot, each wafer being substantially free of agglomerated intrinsic point defects, wherein at least one wafer has crystal lattice vacancies as the predominant intrinsic point defect throughout the wafer, and at least one wafer has silicon self-interstitials as the predominant intrinsic point defect throughout the wafer.